Iterative parameter estimation for metz filter, based on the image quality of breast cancer imaging

Abstract :

The main objective of the study is to estimate the iterative coefficient of Metz filter equation based on different point spread functions and its full width half maximum to acquire the best filtered image of semi-compressed breast phantom. The semi-compressed breast phantom image is generated using Monte Carlo N-Particle software version 5. Two parameters of the image quality, which are contrast to background ratio and fluctuation error are becoming our interest to be improved. These parameters indicate the visibility of the tumor and the presence of the noise in the image respectively. Every image is filtered with incremental value of the Metz filter iterative coefficient and full width half maximum of four different types of point spread function which are Gaussian, radial, Gaussian-ellipse and sinusoidal distortion. Varying these parameters will directly effect the tumor contrast and the fluctuation error of the image produced. The best filtered image produced is automatically selected, based on the output image with the highest tumor contrast and lowest fluctuation error. The algorithm is tested for one thousand samples of semicompressed breast phantom image, to evaluate the performance of each different types of PSF and its relation to the selection of the iterative coefficient. At the end of the study, we propose an equation to estimate the iterative coefficient of Metz filter equation based on the suitable full width half maximum of Gaussian point spread function.